

WHAT IS CLAIMED IS:

1. A hydrogen absorbing tank apparatus comprising:
a hydrogen absorbing tank containing a hydrogen absorbing material
that allows hydrogen gas to move into the hydrogen absorbing tank from an outside
5 thereof and to move out of the hydrogen absorbing tank;
a gas compressor disposed between the hydrogen absorbing tank and a
hydrogen gas consumer device, the gas compressor compressing the hydrogen gas
output from the hydrogen absorbing tank at least to a predetermined reference pressure
of the hydrogen gas consumer device;
10 a bypass that opens only when a hydrogen gas generating pressure of the
hydrogen absorbing tank is higher than the predetermined reference pressure, the
bypass connected between the hydrogen absorbing tank and the hydrogen gas consumer
device in parallel to the gas compressor; and
a controller that operates the gas compressor to compress hydrogen gas
15 output from the hydrogen absorbing tank at least to the predetermined reference
pressure when the hydrogen absorbing tank has a low temperature and the hydrogen gas
generating pressure of the hydrogen absorbing tank is believed to be lower than the
predetermined reference pressure.
2. A hydrogen absorbing tank apparatus according to claim 1, wherein:
20 the hydrogen absorbing tank has a temperature sensor; and
the controller determines whether the hydrogen gas generating pressure
is lower than the predetermined reference pressure based on a temperature detected by
the temperature sensor.
3. A hydrogen absorbing tank apparatus according to claim 1, wherein:
25 the hydrogen absorbing tank has a pressure sensor; and
the controller determines whether the hydrogen gas generating pressure
is lower than the predetermined reference pressure based on a pressure detected by the
pressure sensor.
4. A hydrogen absorbing tank apparatus according to claim 1, wherein:
30 the hydrogen gas consumer device includes a fuel cell from which heat is
supplied to the hydrogen absorbing tank; and
the controller operates the gas compressor during an initial period of
operation of the fuel cell.

5. A hydrogen absorbing tank apparatus according to claim 4, wherein at least one of the gas compressor and a motor that operates the gas compressor is connected to at least one of the fuel cell and the hydrogen absorbing tank by a heating medium circulating passage in which a heating medium circulates, and the at least one of the fuel cell and the hydrogen absorbing tank is heated by the heating medium heated by the at least one of the gas compressor and the motor that operates the gas compressor.

6. A hydrogen absorbing tank apparatus according to claim 4, wherein the controller operates the gas compressor when an amount of hydrogen stored in the hydrogen absorbing tank has decreased and the hydrogen gas generating pressure of the hydrogen absorbing tank has decreased.

7. A hydrogen absorbing tank apparatus according to claim 4, further comprising:

a hydrogen gas generator that supplies hydrogen gas to the hydrogen absorbing tank; wherein

when a hydrogen gas generating pressure of the hydrogen gas generator is lower than a predetermined pressure, the controller increases, by using the gas compressor, a pressure of hydrogen gas supplied from the hydrogen gas generator to the hydrogen absorbing tank.

8. A hydrogen absorbing tank apparatus according to claim 4, further comprising:

a hydrogen gas generator that supplies hydrogen gas to the hydrogen gas consumer device; wherein

when a hydrogen gas generating pressure of the hydrogen gas generator is lower than the reference pressure of the hydrogen gas consumer device, the controller increases, by using the gas compressor, a pressure of hydrogen gas supplied from the hydrogen gas generator to the hydrogen consumer device.

9. A hydrogen absorbing tank apparatus according to claim 1, wherein the bypass includes a bypass passage that bypasses the gas compressor, and a valve provided in the bypass passage, the valve being openable at a predetermined pressure.

10. A hydrogen absorbing tank apparatus comprising:

a hydrogen absorbing tank containing a hydrogen absorbing material, a hydrogen inlet and a hydrogen outlet;

a gas compressor in communication with the hydrogen outlet of the hydrogen absorbing tank, the gas compressor compressing the hydrogen gas output from the hydrogen absorbing tank at least to a predetermined reference pressure;

5 a bypass in communication with the hydrogen outlet of the hydrogen absorbing tank, the bypass opening only when a hydrogen gas generating pressure of the hydrogen absorbing tank is higher than the predetermined reference pressure, the bypass defining a flow path in parallel to a flow path defined by the gas compressor; and

10 a controller that operates the gas compressor to compress hydrogen gas output from the hydrogen absorbing tank at least to the predetermined reference pressure when the hydrogen absorbing tank has a low temperature and the hydrogen gas generating pressure of the hydrogen absorbing tank is believed to be lower than the predetermined reference pressure.

11. A hydrogen absorbing tank apparatus according to claim 10, wherein: the hydrogen absorbing tank has a temperature sensor; and

15 the controller determines whether the hydrogen gas generating pressure is lower than the predetermined reference pressure based on a temperature detected by the temperature sensor.

12. A hydrogen absorbing tank apparatus according to claim 10, wherein: the hydrogen absorbing tank has a pressure sensor; and

20 the controller determines whether the hydrogen gas generating pressure is lower than the predetermined reference pressure based on a pressure detected by the pressure sensor.

13. A hydrogen absorbing tank apparatus according to claim 10, wherein the bypass includes a bypass passage that bypasses the gas compressor, and a valve

25 provided in the bypass passage, the valve being openable at a predetermined pressure.

14. A method of operating a hydrogen absorbing tank apparatus comprising: storing hydrogen gas in a hydrogen absorbing tank containing a hydrogen absorbing material that allows the hydrogen gas to move into the hydrogen absorbing tank from an outside thereof and to move out of the hydrogen absorbing tank;

30 using a gas compressor disposed between the hydrogen absorbing tank and a hydrogen gas consumer device to compress the hydrogen gas output from the hydrogen absorbing tank at least to a predetermined reference pressure of the hydrogen gas consumer device;

using a bypass connected between the hydrogen absorbing tank and the hydrogen gas consumer device in parallel to the gas compressor to convey the hydrogen gas from the hydrogen absorbing tank to the hydrogen gas consumer device, the bypass opening only when a hydrogen gas generating pressure of the hydrogen absorbing tank is higher than the predetermined reference pressure; and

controlling the gas compressor to compress hydrogen gas output from the hydrogen absorbing tank at least to the predetermined reference pressure when the hydrogen absorbing tank has a low temperature and the hydrogen gas generating pressure of the hydrogen absorbing tank is believed to be lower than the predetermined reference pressure.

15. A method according to claim 14, further comprising:
detecting a temperature of the hydrogen absorbing tank; and
controlling the gas compressor by determining whether the hydrogen gas generating pressure is lower than the predetermined reference pressure based on the detected temperature.

16. A method according to claim 14, further comprising:
detecting a pressure of the hydrogen absorbing tank; and
controlling the gas compressor by determining whether the hydrogen gas generating pressure is lower than the predetermined reference pressure based on the detected pressure.

17. A method according to claim 14, wherein:
the hydrogen gas consumer device includes a fuel cell from which heat is supplied to the hydrogen absorbing tank; and
the controlling step includes operating the gas compressor during an initial period of operation of the fuel cell.

18. A method according to claim 17, wherein at least one of the gas compressor and a motor that operates the gas compressor is connected to at least one of the fuel cell and the hydrogen absorbing tank by a heating medium circulating passage in which a heating medium circulates, and the at least one of the fuel cell and the hydrogen absorbing tank is heated by the heating medium heated by the at least one of the gas compressor and the motor that operates the gas compressor.

19. A method according to claim 17, wherein the controlling step includes operating the gas compressor when an amount of hydrogen stored in the hydrogen

absorbing tank has decreased and the hydrogen gas generating pressure of the hydrogen absorbing tank has decreased.

20. A method according to claim 17, further comprising:
supplying hydrogen gas to the hydrogen absorbing tank with a hydrogen
5 gas generator; and

when a hydrogen gas generating pressure of the hydrogen gas generator is lower than a predetermined pressure, the controlling step includes increasing, by using the gas compressor, a pressure of hydrogen gas supplied from the hydrogen gas generator to the hydrogen absorbing tank.

10 21. A method according to claim 17, further comprising:
supplying hydrogen gas to the hydrogen gas consumer device with a hydrogen gas generator; and

when a hydrogen gas generating pressure of the hydrogen gas generator is lower than the predetermined reference pressure of the hydrogen gas consumer device, the controlling step includes increasing, by using the gas compressor, a pressure of hydrogen gas supplied from the hydrogen gas generator to the hydrogen gas consumer device.

15 22. A method according to claim 14, wherein the bypass includes a bypass passage that bypasses the gas compressor, and a valve provided in the bypass passage,
20 the valve is opened at a predetermined pressure.